

Apparatus for the dynamic stabilization of bones or bone  
fragments, in particular spinal vertebrae

CLAIMS

1. Apparatus for the dynamic stabilization of bones or bone fragments, in particular spinal vertebrae (V), with at least one longitudinal support (11) that can be fixed to the vertebrae (V),  
characterized in that the at least one longitudinal support (11) is so constructed that by application of a prespecified bending force it can be plastically deformed from a first stable shape state "A" into a second, alternative stable shape state "B", but while in the first as well as in the second state remains flexible within predetermined limits ("elastic flexion range").
2. Apparatus according to Claim 1, characterized in that the longitudinal support (11) is such that when clamped at one end, while within a stable shape state "A" or "B" it can be elastically deflected by an angle of 5° to 12°, in particular about 8°, over a length corresponding to the spacing of two adjacent vertebrae, or about 2 to 5 cm.
3. Apparatus according to Claim 1 or 2, characterized in that the longitudinal support (11) is constructed so as to be stable, i.e. unyielding, both with respect to anatomically usual longitudinal shear forces and with respect to anatomically usual transverse shear forces.

- 2 -

4. Apparatus according to one of the claims 1 to 3,  
characterized in that the longitudinal support (11) is  
constructed so as to be substantially stable with respect  
to torsion.
- 5 5. Apparatus according to one of the claims 1 to 4,  
characterized in that the longitudinal support (11) is  
constructed in the shape of a flat band or strip.
6. Apparatus according to one of the claims 1 to 4,  
characterized in that the longitudinal support (11) is  
10 constructed so as to be rotationally symmetrical.
7. Apparatus according to one of the claims 1 to 4,  
characterized in that the longitudinal support (11) is  
hollow, in particular is constructed as a hollow rod.
8. Apparatus according to one of the claims 1 to 7,  
15 characterized in that the longitudinal support (11)  
comprises an in particular plastically deformable core (12)  
made of metal, in particular titanium or a titanium alloy,  
which is encased in a human-tissue-compatible plastic (13),  
in particular one that ensures flexibility within a stable  
20 shape state.
9. Apparatus, in particular according to one of the claims 1  
to 8,  
characterized in that the longitudinal support (11) is so  
dimensioned that within the elastic flexion range its  
25 surface stress is always below the dynamic breaking stress.

- 3 -

10. Apparatus according to Claim 8 or 9,  
characterized in that in the case of a longitudinal support  
with core (12), both the core and the casing (13) are  
dimensioned such that in the elastic flexion range the  
5 surface stress of both core (12) and casing (13) is always  
below the respective dynamic breaking stress.
11. Apparatus according to one of the claims 8 to 10,  
characterized in that the core (12) is encased in more than  
one layer.
- 10 12. Apparatus according to one of the claims 1 to 11,  
characterized in that it comprises bone-anchoring means, in  
particular pedicle screws (10), to which the longitudinal  
support or supports (11) can be fixed.
13. Apparatus according to one of the claims 1 to 12,  
15 characterized in that it comprises longitudinal-support-  
connecting means, which can be used to connect at least two  
support sections to one another.
14. Apparatus according to Claim 13,  
characterized in that the longitudinal-support-connecting  
20 means comprise two oppositely situated support-receiving  
openings, into each of which an end section of the support  
can be inserted and fixed by way of a clamping screw or  
similar clamping element.
15. Apparatus, in particular according to one of the claims 1  
25 to 14,  
characterized in that the bone-anchoring means comprise  
longitudinal-support-receiving openings that can be spaced  
at variable axial distances from the opposite distal end,  
so that the longitudinal support (11) can be adjusted to a  
30 correspondingly different distance from the vertebra (V).

- 4 -

16. Apparatus according to one of the claims 8 to 15,  
characterized in that the core (12) is constructed in the  
form of a flat band or strip, with a width smaller than or  
equal to the corresponding dimension of the longitudinal  
support.
17. Apparatus according to one of the claims 8 to 15,  
characterized in that the core (12) is rotationally  
symmetrical, in particular circular, with either a constant  
diameter or a diameter that varies along the length of the  
longitudinal support.
18. Apparatus according to Claim 17,  
characterized in that the diameter of the core (12), at  
least in sections, is continually enlarged or reduced  
and/or altered in a stepwise manner, such that in the last  
case the transitions in the region of a step are  
constructed so as to reduce stress, in particular are  
rounded.